



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p><b>(21) International Application Number:</b> PCT/GB90/01739</p> <p><b>(22) International Filing Date:</b> 12 November 1990 (12.11.90)</p> <p><b>(30) Priority data:</b> 8925552.5 11 November 1989 (11.11.89) GB</p> <p><b>(71) Applicant (for all designated States except US):</b> GEC PLESSEY TELECOMMUNICATIONS LIMITED [GB/GB]; New Century Park, P.O. Box 53, Coventry CV3 1HJ (GB).</p> <p><b>(72) Inventors; and</b>  <b>(75) Inventors/Applicants (for US only) :</b> BARNES, Nigel, Everard [ZA/GB]; 26 Arnside, Stapleford, Nottingham NG9 7EY (GB). CORBETT, Colin [GB/GB]; 40 Alford Close, Beeston, Nottingham NG9 1QP (GB).</p>		<p><b>(74) Agent:</b> HOSTE, Colin, Francis; The General Electric Company, plc, GEC Patent Department (Wembley Office), Hirst Research Centre, East Lane, Wembley, Middlesex HA9 7PP (GB).</p> <p><b>(81) Designated States:</b> AT (European patent), AU, BE (European patent), BG, CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), SU, US.</p> <p><b>Published</b>  <i>With international search report.</i></p>
<p><b>(54) Title:</b> CORDLESS TELEPHONE REGISTRATION METHOD</p> <p><b>(57) Abstract</b></p> <p>The invention concerns a method of on-air registration of a cordless telephone handset with a base station, the method comprising the steps of: arming the handset so that it can indicate that it wants to register with a base station; arming the network to enable it to accept the registration request from the handset; activating the handset to start transmitting link request words; causing the base station and the associated network to determine that the link set up is to be used for registration purposes, causing the base station to use the handsets identity to decide if that handset has a pending registration request, and transferring into the handset the registration details over the established link.</p>		

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CORDLESS TELEPHONE REGISTRATION METHOD

The present invention relates to a method of on air registration of a cordless telephone with a base station.

The invention finds application in the second generation of cordless telephones, commonly known as (CT2) in which the transmission method employed is called 'burst mode' transmission.

In burst mode transmission, the information to be transmitted is accumulated by a unit's transmitter, and transmitted in a 'burst' to a receiving unit, after which the unit's transmitter is switched off, and the unit's receiver is switched on. The receiver is then expecting to receive a similar burst from the other unit. These bursts are transmitted and received by the two units on the same radio frequency.

Under the existing situation, if the user wishes to gain access to, for example a telepoint network, a user has to register to at least that network. The transmissions between the user and the network through free space is by virtue of a radio link used in accordance with what is commonly called the Common Air Interface. the Common Air Interface is a published document MPT1375 and is published by the Department of Trade and Industry, the last publication being May 1989. The Common Air Interface sets down the

conditions which all users have to meet in order to communicate with their respective base stations. Each base station in the telepoint network is capable of receiving communications from a number of handheld user stations, and therefore, providing the user is within sufficient range to enable radio communication to occur between the user's handset and the base station, the base station can handle the call. The base station would typically interface with the public switched telephone network.

Registration of a handset to a network is achieved by using values of a link identification code.

The information that is loaded into the handset consists of:-

- 1) 16 bits of a link identification code value, which is used when establishing link to identify the network or service required,
- 2) 64 bits of a personal identification number value, which is an encrypted binary number, which together with the handsets own identity may serve to identify the handset and/or user with greater security. This personal identification number value is derived from a variety of numbers, and may include the handset's unique identity number,
- 3) a nine bit value which is used to identify the home network, that is the network operator from whom the data is obtained,
- 4) a 3 bit value, which indicates to the network the class of service available to the handset,
- 5) up to 20 binary coded decimal digits (BCD) which could be used as an account number to which the call charges is to be billed.

All of the above data needs to be entered into the handset, which hitherto has been done manually. This results in a digit sequence to be dialled in to the handset by the user wishing to register with a network. The number of key strokes to be entered can be up to 66 digits, which is likely to be an error prone and tedious

take for the user.

An additional numbr which is used during authentication for access to a telepoint network is also required, which is a four bit binary number (ZAP). This number is not entered by the user and is specifically barred from being entered by the user. This value can however be altered by messages over the radio link.

The use of the ZAP value causes some problems as it is one of the numbers used to calculated the personal identification number and in doing so the network has to assume a value for ZAP which can have one of 16 values. When a newly registered user tries to access a network for the first time, the authentication is likely to fail, because the assumed ZAP value is likely to be different from the actual value in the handset. This means that the network will have to instruct the handset to alter the ZAP value up to 15 times in order for authentication to be ultimately successful. This adds to network complexity and is a relatively time consuming task.

In summary, there are two problems associated with the existing method, the long, tedious and potentially error prone manual entry of data, and the increased network complexity due to the lack of knowledge of the ZAP values.

Therefore, it is object of the present invention to provide a method which overcomes these problems in an efficient manner, which requires less network complexity and is substantially less error prone.

According to the present invention there is provided a method of on air registration of a telephone handset with a base station, the method comprising the steps of:

- arming the handset so that it can indicate that it wants to register with a base station,
- arming the network to enable it to accept the registration request from the handset,
- activitating the handset to start transmitting link request code words,
- causing the base station and the associated network to determine that the link set up is to be used for registration purposes,

causing the base station to use the handset's identity to decide if that handset has a pending registration request, transferring into the handset the registration details over the established link.

According to an aspect of the present invention the handset is armed by first operating a proprietary key sequence and entering into the handset link identification values for indicating that registration is requested.

According to yet another aspect of the invention, the network is armed by being given the handset's own unique identity number, and after a link has been properly initialised the handset sends a feature activation message, which is recognised by the base station which causes the base station to determine that the handset wants to register, and the base station and associated network using the handset's identity number causes the registration details to be transferred to the handset.

An embodiment of the present invention will now be described.

In order to overcome the above mentioned problems, it is necessary for the number of key strokes to be limited to a minimum, and to load up the bulk of the information including the ZAP data over a special air link set up between the handset and the base station. In order for this to occur the handset needs to be 'armed' or prepared so that it can indicate that it wants to register, and similarly, the network itself must be armed to accept the registration request from the handset. The base station forms part of the network.

To arm the handset, firstly, a proprietary key sequence is invoked which identifies that the handset wishes to register with the network. After invoking the key sequence, special link identification values are entered into the handset. These link identification values may differ from those values used to set up the telepoint radio link.

The network is armed by being given the handset's own unique identity number, specified during the handset's manufacture. In addition, the networks computers calculate all values described

above in preparation for the request from the handset.

After the handset and network have both been armed the user then locates a base station associated with the network they have joined, and presses a key sequence on the cordless handset to set up a radio link. This causes the handset to start transmitting link request code words in signalling multiplex mode 3, commonly known as MUX3, using the link identification value previously entered.

The receiving base station recognises the link request value, and responds after the link has been previously initialised. The handset subsequently sends a feature activation message, which is used by the base station to determine that the link is to be used for registration. The network then takes the handset's identity, and uses this to firstly check the handset has a pending registration request. If such a request is pending, the registration details are transferred into the handset from the base station, using a proprietary reserved information element in the aforementioned Common Air Interface.

It will be appreciated that variations of the above described method can be envisaged by those skilled in the art and such variations are to be considered to be within the scope and spirit of the present invention.

CLAIMS

1. A method of an-air registration of a cordless telephone handset with a base station, the method comprising the steps of:
  - arming the handset so that it can indicate that it wants to register with a base station;
  - arming the network to enable it to accept the registration request from the handset;
  - activating the handset to start transmitting link request words;
  - causing the base station and the associated network to determine that the link set up is to be used for registration purposes, causing the base station to use the handsets identity to decide if that handset has a pending registration request, and transferring into the handset the registration details over the established link.



## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 90/01739

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) <sup>1</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 H04Q7/04 ; H04M1/72		
II. FIELDS SEARCHED		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	H04Q ; H04M	
Documentation Searched other than Minimum Documentation in the extent that such Documents are included in the Fields Searched <sup>8</sup>		
III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	EP,A,301573 (NEC) 01 February 1989 see column 1, line 32 - column 2, line 14 see column 2, lines 33 - 46 see column 3, line 24 - column 5, line 26 ---	1
A	37th IEEE VEHICULAR TECHNOLOGY CONFERENCE June 1987, TAMPA (US) pages 579 - 586; T.HATTORI et al: "A New Mobile Communication System using Autonomous Radio Link Control with Decentralized Base Stations" see page 581, left-hand column, paragraph 5 - page 582, left-hand column, paragraph 6 ---	1
A	EP,A,291068 (NEC) 17 November 1988 see column 1, lines 1 - 26 see column 1, line 42 - column 2, line 13 see column 4, lines 1 - 31 see column 5, line 25 - column 6, line 57 --- -/-	1
<p><sup>10</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
04 FEBRUARY 1991	27 FEB 1991	
International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer GERLING J.C.J.	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,2193861 (BRITISH TELECOM.) 17 February 1988 see page 2, lines 9 - 45 see page 2, lines 68 - 105 ---	1

# ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9001739

SA 41734

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on  
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04/02/91

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-301573	01-02-89	JP-A- 1036130	07-02-89
		JP-A- 1129557	22-05-89
		AU-B- 594624	08-03-90
		US-A- 4864599	05-09-89
EP-A-291068	17-11-88	JP-A- 63280524	17-11-88
		AU-B- 594298	01-03-90
		US-A- 4833702	23-05-89
GB-A-2193861	17-02-88	None	